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1. A method of determining the etch rate and time to etch as
a function of the properties of the etching process and of
3 the film being etched, comprising the steps of:

providing a rate formula $ER(C,T) = ER_0 * C * \exp(-E_a/RT) + A$;

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providing a substrate;

9 providing an etch bath in a tank;

providing an etch concentration monitor in said tank;

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providing a temperature monitor in said tank;

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forming a film over said substrate;

measuring the initial thickness of said film over said
8 substrate;

placing said film on said substrate in said tank;

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starting the etching of said film in said tank, and
simultaneously recording the start time of said etching;

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measuring a first temperature of said etch bath in said tank;

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measuring a first concentration of said etch bath in said tank;

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stopping said etching of said film, and recording the stop time of said etching;

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removing said substrate with said film thereon from said tank;

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measuring the final thickness of said film on said substrate;

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calculating a first film loss by subtracting said initial thickness from said final thickness of said film;

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calculating a first etch time by subtracting said start time from said stop time of etching;

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calculating a first etch rate $(ER(T,C)_1)$ as a function of said first temperature and first concentration;

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repeating previous steps at second, third, (n-1) and n
temperatures while holding constant said first
51 concentration, and calculating the corresponding second,
third, (n-1) and nth etch rates $[ER(T)_{c2}, \dots, ER(T)_{c(n-1)},$
 $ER(T)_{cn}]$ values as a function of said temperatures, and their
54 statistical average $(ER(T)_{c,avg.})$;

repeating previous steps at second, third, (n-1) and n
57 concentration while holding constant said first temperature,
and calculating the corresponding second, third, (n-1) and
nth etch rates $[ER(C)_{T2}, \dots, ER(C)_{T(n-1)}, ER(C)_{Tn}]$ values as a
60 function of said concentrations, and their statistical
average $(ER(C)_{T,avg.})$;

63 using said values in said formula to calculate etch rate ER
for subsequent etching of said film for a specified film
loss or to a specified film thickness;

66 providing a substrate having formed thereon a first film to
be etched and a second film, wherein a first film thickness
69 of said first film is less than a second film thickness of
said second film;

72 calculating a film loss ΔH for said specified film loss or
for said specified film thickness; and

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75 calculating etch time.

2. The method of claim 1, wherein said $ER(C,T)$ is etch rate as a function of concentration (C), and temperature (T).

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3. The method of claim 1, wherein said C is etch solution concentration, E_a , etch activation energy, R, universal gas constant, T, temperature of the etch solution, ER_0 , a constant, and A, another constant.

4. The method of claim 1, wherein said initial film thickness is designated as H_A and said final film thickness is designated as H_B .

5. The method of claim 1, wherein said film loss is $\Delta H = (H_A - H_B)$.

6. The method of claim 1, wherein said etch time is calculated using the formula $t = \Delta H / ER$.

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7. A method of determining the etch rate and time to etch as a function of the properties of the etching process and of the film being etched, comprising the steps of:

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providing a rate formula $ER(C,T) = ER_0 * C * \exp(-E_a/RT) + A$;

rewriting said formula in a simplified form as $ER(C) = K * C + A$;

determining the values of first constant K and second constant A in said formula for said etching solution;

using said values of said first and second constants in said simplified equation to calculate an etch rate;

providing a target film loss or a target film thickness; and

calculating etching time, or "time to etch".

8. The method of claim 7, wherein said $ER(C,T)$ is etch rate as a function of concentration (C) , and temperature (T) .

9. The method of claim 7, wherein said C is etch solution concentration, E_a , etch activation energy, R , universal gas constant, T , temperature of the etch solution, ER_0 , a constant and A , another constant.

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10. The method of claim 7, wherein said etching time is obtained by dividing said target film loss by said etch rate.

11. A method of determining the etch rate and time to etch as a function of the properties of the etching process and of the film being etched, comprising the steps of:

providing a rate formula $ER(C,T) = ER_0 * C * \exp(-E_a/RT) + A$;

rewriting said formula in a simplified form as $ER(C) = K * C + A$;

determining the values of first constant K and second constant A in said formula for said etching solution;

using said values of said first and second constants in said simplified equation to calculate an etch rate;

providing a substrate having formed thereon a first film A to be etched and a second film B, wherein a first film thickness of said first film A is H_A , and a second film thickness of said second film B is H_B ;

calculating a film loss ΔH ; and

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calculating etch time.

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12. The method of claim 11, wherein said $ER(C,T)$ is etch rate as a function of concentration (C), and temperature (T).

13. The method of claim 11, wherein said C is etch solution concentration, E_a , etch activation energy, R, universal gas constant, T, temperature of the etch solution, ER_0 , a constant, and A, another constant.

14. The method of claim 11, wherein said film loss ΔH is $x - (H_B - H_A)$, wherein said H_B is greater than said H_A , and x is the desired depth height of said film A above said film B after etch.

15. The method of claim 11, wherein said film loss is $\Delta H = (H_A - H_B) - x$, wherein said H_A is greater than said H_B , and x is the desired depth height of said film A above said film B after etch.

16. The method of claim 11, wherein said film loss is $\Delta H = (H_A - H_B)$, wherein before etch, said H_A is greater than said H_B , and after etch, they are of the same height.

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17. The method of claim 11, wherein said film loss is $\Delta H = (H_A - H_B) + x$, wherein before etch, said H_A is greater than said H_B , and after etch, said film B is higher than said film A by the step height of x .

18. The method of claim 11, wherein said etch time is calculated using the formula $t = \Delta H / ER$.

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